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09/593,275	06/13/2000	Upendra V. Chaudhari	YOR-2000-0168US1	7772

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FERENCE & ASSOCIATES  
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PITTSBURGH, PA 15143

EXAMINER
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HAN, QI

ART UNIT	PAPER NUMBER
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2654

15

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/593,275

Applicant(s)

CHAUDHARI ET AL.

Examiner

Qi Han

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2004.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-3, 6-12, 14-16, 19-25, 27 is/are rejected.  
7) ☒ Claim(s) 4, 5, 13, 17, 18 and 26 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

#### ***Response to Amendments***

2. This communication is responsive to the applicant's response dated 04/03/2004 (Paper 14). Applicant amended claims 13 and 26.

3. The amendment (see paper 14, page 2) regarding equitation 1 on page 8 in the specification is still incorrect, so that the objection will be retained.

#### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1-3, 6-12, 14-16, 19-25 and 27 have been fully considered but they are not persuasive.

5. In response to applicant's arguments regarding the objection about the limitation of "non-interpolated likelihood value" in claims 1, 14 and 27 (see paper 14, page 13, paragraph 2), the examiner had pointed out that 'the specification is objected to as failing to provide *proper* antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o)... the term of "non-interpolated likelihood value" is unclear, since applicant has failed to provide a particular explanation or definition for the term in the specification and the claims. "non-interpolated likelihood value" is not a commonly

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accepted technical term in the art' (see paper 7, page 2: the specification objection of the previous office action) . Applicant argues that "the term appears several places within the specification" and gives page and line numbers in the specification, for referring the argued issue. However, in reviewing of the applicant's referenced places in the specification, page 4, line 14 and page 5, lines 4 and 13, only repeat the claim limitations in the summary section, without any definition and description about the argued term. Because the claimed limitation of "non-interpolated likelihood" is not commonly used term in the art (as evidenced by the examiner who searched whole PTO database and most popular commercial databases, such as IEEE and Google), the term only repeatedly appearing in the summary and claims is not enough as being *proper* antecedent basis. Applicant should provide clear definition or description for the customized term(s), but the applicant fails to do so in this case. Further, applicant's referenced page 3, lines 4-5 and page 10, lines 11-12, saying "the actual likelihoods ... into account" and "no need for interpolation constants", are not definition or description of "non-interpolated likelihood value", and from them, one skilled in the art cannot obtain any idea of **what is** "a non-interpolated likelihood value". By the way, it is noted that this issue is under specification objection (see paper 7, page 2, section 3), not under 35 USC 112 rejection as applicant argued (see paper 14, page 13, paragraph 2), even though it might be related to the 112 rejection. For above reason, the objection will be retained.

6. In response to applicant's arguments regarding claims 1-3, 6-12, 14-16, 19-25 and 27 under 35 USC 103(a) that the prior art does not teach limitation of "non-interpolated likelihood

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value” (paper 14, page 14, paragraph 1), it is noted that this limitation is directly related to the objection as stated above. As best understood in view of the disclosure objection, the argued and claimed limitation “non-interpolated likelihood value” is broadly interpreted as any likelihood value, since this term is not defined or described in the original specification.

In response to applicant’s arguments regarding “no motivation to combine the references” and “no expectation of success” and “not produce the claimed invention”, it is noted that applicant does not give specific reason(s) for supporting the applicant’s argument, so that examiner cannot further provide specific response regarding this issue, even though examiner disagrees with applicant and has a different view of prior art teachings and claim interpretation. However, as a general response, it is pointed out that the both cited references are in the same field of endeavor, which is speaker recognition art, and increasing efficiency and quality is a general goal as motivation to combine the references for a recognition system. Therefore, examiner will retain the claim rejection based on the combination of cited references (see detail in the claim rejection of the office action).

### *Specification*

7. The disclosure is objected to because of the following informalities:

a. On page 8, equation (1), the variable “ $P(u_i | M(i, j, (i, t)))$ ” appears to be “ $P(u_i | M(i, j(i, t)))$ ”. Appropriate correction is required.

8. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o).

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Regarding **claims 1, 14 and 27**, the claimed term of “non-interpolated likelihood value” is unclear and does not specifically defined or described in the specification and the claims. Since the terminology of “non-interpolated likelihood value” is not a commonly accepted technical term in the art, as evidenced by the examiner who searched whole PTO database and most popular commercial databases, such as IEEE and Google, applicant should clearly defined or described in the specification, but applicant fails to do so. As best understood in view of the disclosure objection, the claimed limitation “non-interpolated likelihood value” will be broadly interpreted as any likelihood value hereinafter. Appropriate correction is required.

#### ***Claim Objections***

9. Claims 13 and 26 are objected to because of the following informalities:

Regarding claims 13 and 26, the variable T in the amended limitation lacks antecedent basis in the claim and variable C in the claimed equation is not defined or described. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

10. Claims 1-3, 6-12, 14-16, 19-25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldenthal et al. (USPN 6,205,424) hereinafter referenced as Goldenthal, in view of Newman et al. (USPN 5,946,654) hereinafter referenced as Newman.

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Regarding **claim 1**, as best understood in view of the objection (see above), Goldenthal discloses two-staged cohort selection for speaker verification system.

Goldenthal further discloses that:

- a. in a speaker verification system, individuals having known identities supply utterances or speech samples during training sessions, and a temporal sequence of observation vectors (frames) from a sample of speech signals contains a set of acoustic features, the frames of the various individuals can be further processed to create models representing the speech (column 1, lines 35-45), and the model generator can use pattern classification and recognition methodology that is a segment based speech processing in that designated segment can be units of speech, such as phones, or transition from one phone to another (column 4, lines 8-29), which corresponds to the claimed "providing a model corresponding to a target speaker, the model being resolved into at least one frame and at least one level of phonetic detail;"
- b. the claimed identity of an individual can be verified by having the individual utter a prompted sequence of words or spontaneous speech during a testing session (column 1, lines 47-49), which corresponds to the claimed "receiving an identity claim;"
- c. the validation or testing speech signals are analyzed and compared with the prestored observation models corresponding to the "claimed" identity to determine scores, the scores can be expressed as log likelihood scores:  $\text{score} = \log p(O/I)$ , where  $p$  represents the likelihood that the observed frames  $O$  were produced by the individual  $I$ , and if the scores exceed a predetermined threshold, it is presumed that the individual is who he or she claims to be (column 1, lines 50-57), which corresponds to the claimed

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“ascertaining whether the identity claim corresponds to the target speaker model; said ascertaining step comprising the steps of: determining, for each frame and each level of phonetic detail of the target speaker model, a non-interpolated likelihood value; and resolving the at least one likelihood value to obtain a likelihood score.”

But, Goldenthal fails to expressly disclose “each level of phonetic detail of target speaker model.” However, the examiner contends that the concept of providing phonetic detail levels was well known, as taught by Newman.

In the same field of endeavor, Newman discloses speaker identification using unsupervised speech models. Newman further discloses that each word 700 (Fig. 7) is represented by a set of phonemes 705 that represent the phonetic spelling of the word, and each phoneme is represented by three sets of model parameters 710 that correspond to the three nodes of the phoneme (column 6, lines 29-34).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Goldenthal by specifically providing phonetic detail levels, as taught by Newman, for the purpose of increasing efficiency and quality of a recognition system.

Regarding **claim 2**, as best understood in view of the objection (see above), Goldenthal and Newman disclose everything claimed, as applied above (see claim 1). Goldenthal further discloses a log likelihood score (column 1, lines 53-54). Moreover, Goldenthal teaches that the normalized score comprises a log likelihood function  $f$  that can be statistical in nature, as maximum (column 2, lines 21-31), which is interpreted as the claimed “maximum likelihood value”.



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Regarding **claim 3**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 2). Goldenthal further discloses a log likelihood score (column 1, lines 53-54). Moreover, Goldenthal teaches that the normalized score comprises a log likelihood function  $f$  that can be statistical in nature, as average (column 2, lines 21-31), which corresponds to the claimed “said step of resolving the at least one likelihood value comprises averaging the at least one likelihood value.”

Regarding **claim 6**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 2). Goldenthal discloses that the model generator can use pattern classification and recognition methodology that is a segment based speech processing in that designated segment can be units of speech, such as phones, or transition from one phone to another (column 4, lines 8-29), which corresponds to the claimed “the at least one level of phonetic detail comprises at least one of the following: a global level; a phonemic level and a subphonemic level.”

Regarding **claim 7**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 6). But, Goldenthal fails to expressly disclose “the at least one level of phonetic detail comprises all of the following three levels: a global level; a phonemic level and a sub-phonemic level.” However, the examiner contends that the concept of providing all phonetic detail levels was well known, as taught by Newman.

Newman further discloses that each word 700 (Fig. 7) is represented by a set of phonemes 705 that represent the phonetic spelling of the word, and each phoneme is represented by three sets of model parameters 710 that correspond to the three nodes of

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the phoneme (column 6, lines 29-34), which may correspond to the claimed “three levels: a global level; a phonemic level and a sub-phonemic level.”

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Goldenthal by specifically providing all phonetic detail levels, as taught by Newman, for the purpose of increasing efficiency and quality of a recognition system.

Regarding **claim 8**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 7). But, Goldenthal fails to expressly disclose “providing labeling information for each frame.” However, the examiner contends that the concept of providing labeling information for each frame was well known, as taught by Newman.

Newman further discloses that in performing speech recognition, the processor processes the sample 110 (Fig 1) to produce a sequence of frames 115 (step 415) and shows that each frame 500 (Fig. 6) of the sequence of frames includes a set of parameters 600 that represent the frequency content of the frame (column 6, lines 11-25).

Furthermore, Newman discloses that the relationship or index between a set of digital frames 500 (Figs. 5 and 6) received from speech sample 110 (Fig. 1) and a set of parameters 600 (Fig. 6) representing the content of the frame and a set of words (text) 125 (Figs. 1 and 8) referenced by starting frame number (column 5, line 54, column 6, line 14 and column 8, line 32).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify Goldenthal by specifically providing labeling

information for each frame, as taught by Newman, for the purpose of increasing efficiency of a recognition system.

Regarding **claim 9**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 1). Goldenthal further discloses the validation or testing speech signals are analyzed and compared with the prestored observation models corresponding to the "claimed" identity to determine scores and if the scores exceed a predetermined threshold, it is presumed that the individual is who he or she claims to be (column 1, lines 50-57), which corresponds to the claimed "said ascertaining step further comprises accepting or rejecting the identity claim."

Regarding **claim 10**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 9). Goldenthal further discloses that the validation or testing speech signals are analyzed and compared with the prestored observation models corresponding to the "claimed" identity to determine scores and if the scores exceed a predetermined threshold, it is presumed that the individual is who he or she claims to be (column 1, lines 50-57), which corresponds to the claimed "said step of accepting or rejecting comprises comparing a quantity based on the likelihood score to a predetermined threshold value."

Regarding **claim 11**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 10). Goldenthal further discloses that a plurality of sets of "cohort" models (CM) 170 (Fig. 1) that characterize the speech signals of each identified speaker, are selected from the available sets of acoustic models of the other speakers, and the selection can be made according to predetermined selection criteria, for example, the models which best characterize the speech of the identified speaker, or the models whose characterization fits some predetermined probability density function (column 4, lines 49-58), which corresponds to the

claimed “the steps of providing at least one model corresponding to at least one background speaker; and determining the quantity based on the likelihood score via employing the at least one background speaker model.”

Regarding **claim 12**, Goldenthal and Newman disclose everything claimed, as applied above (see claim 11). Goldenthal further discloses that during testing, the score obtained from the models of the speaker whose identity is claimed is compared with all of the scores derived from the small set of cohort models to produce a set of score differences, and the differences are then used as a normalized score =  $\log p(O/I) - f[\log p(O/(C_k(I))]$ , where  $\log p(O/(C_k(I))$  are the scores for the k cohorts linked to the claimed individual (column 2, lines 21-28), which corresponds to the claimed “said step of determining the quantity based on the likelihood comprises determining a log-likelihood ratio based on the likelihood score.”

Regarding **claims 14-16 and 19-25**, they recite an apparatus. The rejection is based on the same reason described for claims 1-3 and 6-12, respectively, because claims 14-16 and 19-25 recite same or similar limitation(s) as claims 1-3 and 6-12, respectively.

Regarding **claim 27**, it discloses a program storage device readable by machine, which corresponds to the method of claim 1. The rejection is based on the same reason described for claim 1 because the claim recites same or similar limitation(s) as claim 1.

#### ***Allowable Subject Matter***

11. Claims 4-5, 13, 17-18 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

Regarding **claim 4**, the prior art of record fail to specifically disclose or fairly suggest a way to determine the likelihood value through a particular equation, as described in the claim, which calculates the likelihood score by using multiple levels of phonetic detail of the speaker model, each level may have multiple processing units, wherein the multiple levels (L) is interpreted as more than one level in most of processing situation.

Regarding **claim 5**, it is dependent claim of the claim 4 and includes all features of its parent claim(s).

Regarding **claim 13**, as best understood in view of the objection (see above), the prior art of record fail to specifically disclose or fairly suggest a way to provides the log-likelihood ration calculation, as described in the claim, employing multiple levels of phonetic detail of the speaker model and background speaker models, wherein each level may have multiple processing units, wherein the multiple levels (L) is interpreted as more than one level in most of processing situation.

Regarding **claim 17,18 and 26**, they are they disclose an apparatus, which corresponds to the method of claims 4, 5 and 26, respectively. The apparatus is inherent in that it simply provides structure for the functionality found in claims 4, 5, and 26, respectively.

The prior art of record provided numerous teachings of alternating types of speaker recognition, identification and verification. However, the features as presented above are not anticipated by, nor made obvious over the prior art of the record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any response to this action should be mailed to:

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(703) 872-9306, (for formal communications; please mark "EXPEDITED  
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Patent Correspondence delivered by hand or delivery services, other than the USPS, should be addressed as follows and brought to U.S. Patent and Trademark Office, 220 20th Street S., Customer Window, **Mail Stop AF**, Crystal Plaza Two, Lobby, Room 1B03, Arlington, VA, 22202

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qi Han whose telephone numbers is (703) 305-5631. The examiner can normally be reached on Monday through Thursday from 9:00 a.m. to 7:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached on (703) 305-6954.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Inquiries regarding the status of submissions relating to an application or questions on the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028 between the hours of 6 a.m. and midnight Monday through Friday EST, or by e-mail at: [ebc@uspto.gov](mailto:ebc@uspto.gov). For general information about the PAIR system, see <http://pair-direct.uspto.gov>.

QH/qh  
August 24, 2004

  
RICHEMOND DORVIL  
SUPERVISORY PATENT EXAMINER